# Nicholas Vadivelu

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## Experience

**NVIDIA** · Performance Software Engineering Intern *Aug 2020 – Dec 2020*

- Reduced BERT/Megatron **inference latency by up to 30%** by enabling sparsity for **TensorRT** in **C++**
- Open-sourced sparse BERT in **Python**, democratizing the current fastest inference implementation

**Uber ATG** · Research Intern *Jan 2020 – Aug 2020*

- Improved **object detection by 90%** (AP) and **motion forecasting by 22%** (L2) of a self-driving neural net under realistic positional error, significantly improving safety for future riders
- Wrote a **first author paper** on the learned positional error correction system (accepted at CoRL)

**Google Brain** · Software Engineering Intern *May 2019 – Aug 2019*

- Unlocked K-FAC for **over 370,000 users** by implementing and open-sourcing automatic support for arbitrary neural network architectures and integrating it into the Keras ecosystem
- Enabled simple **multi-node, multi-GPU/TPU training** with efficient distributed operation placement
- Designed, created, and open-sourced idiomatic, reproducible training recipes for users

**John Hancock Financial** · Data Science Intern *May 2018 – Aug 2018*

- Achieved a **fraud detection rate of 63%** through designing an unsupervised ML model
- Deployed 25 fraud identifying rules in **SQL** that **correctly flagged 100+ out of 20,000+** claims
- Worked closely with clinicians to extract features from **5 new data sources** using **pandas**

**Sunnybrook Research Institute** · Software Developer Intern *Jul 2017 – Aug 2017*

- Improved MRI segmentation accuracy by **up to 80%** by via techniques like watershed and clustering
- Reduced time to contour MRI scans from **~5 hrs to ~40 mins** through automation software

## Publications

**Nicholas Vadivelu**, Mengye Ren, James Tu, Jingkang Wang, Raquel Urtasun. Learning to Communicate and Correct Pose Errors. In *Conference on Robot Learning (CoRL)*, Virtual, 2020

Pranav Subramani, **Nicholas Vadivelu**, Gautam Kamath. Enabling Fast Differentially Private SGD via Just-in-Time Compilation and Vectorization. In *NeuRIPS Privacy-Preserving Machine Learning Workshop*, Virtual, 2020

## Open Source

**PyTorch Ignite:** Improved performance by **up to 63%** by designing and implementing **async updates for distributed metrics** with tests and documentation

## Leadership

**Data Science Club Lectures:** Designed and presented workshops about neural networks in **TensorFlow**, machine learning in **scikit-learn**, and data cleaning in **pandas** for **300+ students**

**WATonomous Design Team:** Implemented real-time object detection in **Tensorflow, OpenCV**

## Projects

**Competitive Pokemon Analysis:** Scraped, visualized, analyzed, and modeled Pokemon data with random forests, boosting trees, and Markov chains in **pandas**, **scikit-learn**, and **matplotlib**

**Thrive Life Simulator:** Created a **3D ray-casting game engine** from scratch for a dinosaur world simulation game in **Java** with **object-oriented design** and detailed documentation

## Education

**University of Waterloo** · Computer Science & Statistics (B. Math) *2017 – 2022*

Research Assistant (Advisors: G. Kamath Fall 2020, P. Poupart Fall 2019, L. Tan Winter 2019)
Cumulative GPA: 3.94/4.00 - Dean's List